

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-239319

(43)Date of publication of application : 27.08.2002

(51)Int.Cl.

B01D 39/16

(21)Application number : 2001-046129

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(22)Date of filing : 22.02.2001

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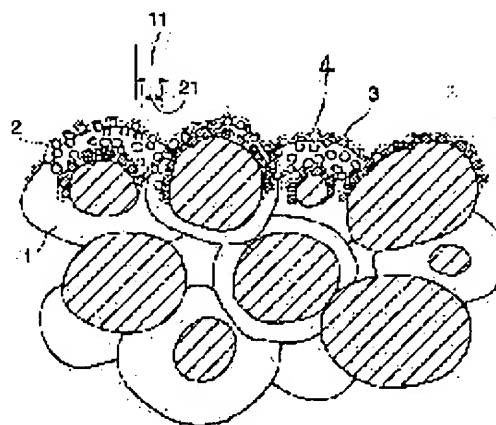
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## (54) FILTER ELEMENT AND MANUFACTURING METHOD THEREFOR

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide a filter element which shows a low level of loss in air permeation pressure and a high dust collecting efficiency and also has an antistatic function and non-self-adhesive properties as well as a manufacturing method for a filter element.

SOLUTION: This filter element is characterized in that a porous surface layer 2 is formed of a raw material containing a vulcanized product of a fluororubber and, if necessary, a fluoro resin 3 and a conductive substance, applied to the surface of a filter element with voids which is obtained by sintering a resin particle 1. Also the manufacturing method for the filter element is provided.



## LEGAL STATUS

[Date of request for examination]

03.06.2004

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3701569

[Date of registration] 22.07.2005

[Number of appeal against examiner's  
decision of rejection]

[Date of requesting appeal against examiner's  
decision of rejection]

[Date of extinction of right]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention] [0001]

[Field of the Invention] While this invention relates to the filter element which incorporates a particle from dusty gas into the dust collector for the product uptake in the dust collector which carries out separation uptake, for example, works, or environmental preservation and providing both the functions of low ventilation pressure force loss and high dust collection efficiency especially, in case the dust deposited on the antistatic function and the filter-element front face is discarded, dust detachability is related with a good filter element and its manufacture approach.

[0002]

[Description of the Prior Art] The filter element formed into free passage porosity is used by sintering synthetic-resin fine particles for the purpose of carrying out uptake of the fine particles generated at works etc., or the dust conventionally, and fabricating an opening.

[0003] Although the dust filtration efficiency which a filter element has is dependent on the magnitude of the aperture of the opening of a porous body, the magnitude of the aperture of this opening changes with magnitude of the particle diameter of the resin fine particles used as a raw material. For example, although the aperture of an opening becomes it large that it is the filter element in which the particle diameter of resin fine particles carried out sinter molding, using a large thing as a raw material, therefore the fine particles with large particle diameter are filtered, can bypass the fine particles with small particle diameter, and they cannot be filtered, but they serve as a filter with low dust collection efficiency.

[0004] Although the aperture of an opening becomes it small that it is the filter element in which the particle diameter of resin fine particles carried out sinter molding on the other hand, using a small thing as a raw material, therefore fine particles with small particle diameter are also filtered, it becomes the filter of high-pressure force loss. Moreover, when a small raw material tends to be used for the particle diameter of resin fine particles and it is going to press down pressure loss low, it is necessary to make thickness of a filter element thin, and the reinforcement of a filter element falls and practicality is missing [ with this ]. Furthermore, when pulverizing the pellet and powder object which are generally marketed and obtaining the raw material of a filter element, it is difficult to obtain fine particles with small particle diameter.

[0005] It was technically difficult to manufacture the filter element which makes the optimal the aperture of the opening of the porous body which constitutes a filter element, is low pressure loss and is satisfied with the manufacture approach of the filter element by the above-mentioned conventional sinter molding method of both the functions of high dust collection efficiency.

[0006] Moreover, as another problem, in order that dust explosion may happen owing to electrification produced between dust and a filter element may prevent this, antistatic nature is given on the surface of a filter element in many cases. Furthermore, although the dust deposited on the surface of the filter element is discarded by the back wash pulse performed suitably, also in order to improve detachability, antistatic nature and non-adhesiveness are required of a filter element in many cases.

[0007] As an approach of giving antistatic nature to the front face of a filter element, conventionally for example, the method of mixing conductive fine particles, such as a carbon metallurgy group, to resin fine particles beforehand, carrying out sinter molding of this mixture after that, and manufacturing a filter element -- or After carrying out melting kneading of resin fine particles and the conductive fine particles, such as a carbon metallurgy group, beforehand, manufacturing the resin which distributed the conductive matter, grinding the resin concerned subsequently and considering as a grinding object, the method of carrying out sinter molding of this and manufacturing a filter element etc. is adopted.

[0008] However, by the above-mentioned former approach aiming at antistatic nature grant, since omission of the conductive matter occurred from sintering resin fine particles or the conductive matter which exists between sintering resin fine particles weakened contact of the sintering resin fine particles concerned, there was a problem of reducing the mechanical strength of a filter element extremely. Moreover, also in the above-mentioned latter approach aiming at antistatic nature grant, since the conductive matter which exists in sintering resin fine particles weakened contact of the sintering resin fine particles concerned, there was a problem of reducing the mechanical strength of a filter element extremely.

[0009]

[Means for Solving the Problem] Offering the filter element which this invention has high dust collection efficiency by the low voltage force loss which solved many above-mentioned problems, and also has an antistatic function and non-adhesiveness, and its manufacture approach, the summary is a filter element characterized by forming the porous surface of the vulcanizate of a fluororubber in the front face of the filter element which has the opening which sintered 1 resin particle and was obtained.

- 2) A porous surface is the filter element of the above 1 characterized by consisting of the vulcanizate and the fluororesin of a fluororubber.
- 3) A porous surface is the filter element of the above 1 characterized by consisting of conductive matter with which the surface electrical resistivity of the vulcanizate of a fluororubber and a filter element becomes 1010 or less ohm/sq.
- 4) A porous surface is the filter element of the above 1 characterized by consisting of conductive matter with which the vulcanizate of a fluororubber, a fluororesin, and the surface electrical resistivity of a filter element become 1010 or less ohm/sq.
- 5) The manufacture approach of the filter element characterized by applying and drying the suspension which suspended the vulcanizing agent of a fluororubber and a fluororubber on the front face of the filter element which has the opening which sintered the resin particle beforehand and was obtained, and forming a porous surface in it.
- 6) Suspension is the manufacture approach of the filter element the above 5 characterized by consisting of the vulcanizing agent and

fluororesin of a fluororubber and a fluororubber.

7) It is the manufacture approach of the filter element the above 5 characterized by suspension consisting of conductive matter with which the vulcanizing agent of a fluororubber and a fluororubber and the surface electrical resistivity of a filter element become 1010 or less ohm/sq.

8) It is the manufacture approach of the filter element the above 5 characterized by suspension consisting of conductive matter with which the vulcanizing agent of a fluororubber and a fluororubber, a fluororesin, and the surface electrical resistivity of a filter element become 1010 or less ohm/sq.

[0010]

[Embodiment of the Invention] Hereafter, the gestalt of operation is explained using a drawing. Drawing 1 is the typical fragmentary sectional view showing an example of the filter element of this invention. As for the aperture of a porous surface, and 3, in drawing 1, the porous surface which in 1 a resin particle and 11 become from the aperture of an opening, and 2 becomes from the quality of vulcanizate of a fluorine, and 21 are [ a fluororesin and 4 ] conductive matter.

[0011] In this invention, the resin particles 1, such as the polyethylene whose mean particle diameter of resin is 50-600 micrometers, polypropylene, phenol resin, a polyether ape phon, polyether imide, Pori Sall John, and a polycarbonate, can use it suitably as a sintering resin raw material of \*\* which manufactures a filter element. By forming the porous surface 2 of the vulcanizate of a fluororubber in the front face of the filter element which has the opening which sintered the above-mentioned resin raw material and was obtained, the aperture 11 of the opening formed in the filter EREMEN concerned can be narrowed, and the dust filtration efficiency of a filter element can be controlled by this. When the above-mentioned porous surface 2 forms from the raw material containing the vulcanizate and the fluororesin 3 of a fluororubber, the filter element to which the dust filtration efficiency was controlled and non-adhesiveness was given by the filter-element front face can be obtained. The raw material of these porosity surface 2 is good to use it in the state of the emulsion which made water distribute three persons of the vulcanizing agent of the emulsion which made water distribute the vulcanizing agent of a fluororubber and a fluororubber or a fluororubber, and a fluororubber, and a fluororesin.

[0012] By forming from the raw material from which the above-mentioned porous surface 2 contained the conductive matter 4 with which the surface electrical resistivity of the vulcanizate of a fluororubber and a filter element becomes 1010 or less ohm/sq, a dust filtration efficiency is controlled and the danger of dust explosion can obtain a very small filter element. By forming from the raw material from which the above-mentioned porous surface 2 contained the conductive matter 4 with which the vulcanizate of a fluororubber, a fluororesin 3, and the surface electrical resistivity of a filter element become 1010 or less ohm/sq, a dust filtration efficiency is controlled, non-adhesiveness is given by the filter-element front face, and the danger of dust explosion can obtain a very small filter element. These fluororesins 3 and the conductive matter 4 can improve dust collection efficiency by containing on the porous surface 2 and narrowing the aperture 11 of an opening to the aperture 21 of a porous surface, as shown in drawing 1.

[0013] Moreover, as matter added in the above-mentioned emulsion liquid in order to give the conductivity of the above-mentioned numeric value to the porous surface 2, it is desirable to use carbon black and the fine particles of a conductive whisker, and it is desirable to consider as the emulsion which decentralized these conductive matter 4 with the little surface active agent. If surface electrical resistivity exceeds 1010 ohm/sq, while dust is charged, adhesion becomes easy to take place and deposition is rash, it will be hard coming to carry out dropping [ pay ] by the back wash which sends pulse air to the filtration direction and the reverse sense. Furthermore, by making it 1010 or less ohm/sq, the amount of electrifications between the dust adhering to a front face is reduced, and the risk of dust explosion disappears.

[0014] What is necessary is just to perform the production process of the filter element which applies the emulsion liquid which distributed the conductive matter 4 to the front face of the filter element which has the opening obtained by carrying out sinter molding of the resin particle 1 beforehand as the manufacture approach of the filter element of this invention so that the suspension which suspended the vulcanizing agent of a fluororubber and a fluororubber may be applied or a fluororesin 3 and surface electrical resistivity may become 1010 or less ohm/sq at this suspension if needed, dries this on it, and forms the porous surface 2 in it. Thus, there are many rubber components according [ a filter-element side ] to bridge formation, while excelling in adhesion force, a part for a fluorine has many front-face sides, the porous surface 2 of the obtained fluororubber which was vulcanized is discarded, and the sex is excellent.

[0015]

[Example] Although the example of this invention is explained concretely below, this invention is not limited to this. In this invention, the aperture 11 of the opening of the resin particle 1 which the filter element sintered observes the front face of a filter element under a microscope with a graduation, measures the aperture of the opening which appeared in the front face clearly, and computes the average per 1 square centimeter. First, the ultra high molecular weight polyethylene whose mean particle diameter is 200 micrometers was sintered, and the filter element (No1) which is the resin sintered compact which has the opening whose thickness the aperture 11 of an average opening is 50 micrometers, and is 2.5mm was fabricated. Subsequently, after painting the liquid which the emulsion which made ion exchange water distribute a fluororesin 3 and the vulcanizate of a fluororubber was made to distribute with the mass ratio which shows carbon black in Table 1 by the volume of 29.0 g/m2 on the front face of the aforementioned resin sintered compact, the filter element (No2) which heats for 30 minutes and it has porous surface 2 at 150 degrees C was obtained.

[0016] Pressure loss measurement of the filter element (No2) which has this porous surface 2, and the filter element before paint (No1), the resistivity measurement on a filter-element front face, and the test result of a fine-particles uptake performance evaluation are shown in Table 2. About the filter element before paint (No1), in the uptake performance test, fine particles bypassed the inside of a filter element using the carbonic acid calcium fine particles whose mean particle diameter is 4.5 micrometers, and the function as a filter was not fully achieved so that more clearly than Table 2. However, the uptake engine performance of fine particles of the filter element (No2) which formed the porous surface 2 in the front face of a resin sintered compact was good. Moreover, in the back wash pulse performed when discarding the dust deposited on the front face of the filter element (2) which has a porous surface, the dust detachability from the front face concerned was very good compared with the filter element before paint (1).

[0017]

[Table 1]

表 1. 塗裝液配合割合 (質量%)

| サンプル | 水   | フッ素樹脂+フッ素ゴムの加硫物 | カーボンブラック |
|------|-----|-----------------|----------|
| A    | 170 | 50              | 30       |

[0018]  
[Table 2]

表 2. 塗装前後の圧力損失、表面抵抗率及び粉体捕集性能の評価結果

| No | フィルタエレメント     | 圧 損<br>(kPa) | 表面抵抗率<br>( $\Omega/\text{sq}$ ) | 粉体捕集<br>性能 |
|----|---------------|--------------|---------------------------------|------------|
| 1  | 樹脂焼結体+（塗装無し）  | 1.33         | $10^{10}$                       | 粉漏れあり      |
| 2  | 樹脂焼結体+（サンプルA） | 2.66         | $10^5$                          | 粉漏れ無し      |

- 1) 圧力損失測定は、濾過風速 $1\text{ m}^3/\text{m}^2 \cdot \text{min}$ で行った。  
2) 粉体捕集試験使用粉塵： $\text{CaCO}_3$  ( $D_p 50 = 4.5\text{ }\mu\text{m}$ )  
：粉塵濃度 $= 25\text{ g}/\text{m}^3$   
：濾過速度 $= 1.0\text{ m}/\text{min}$   
3) 逆洗パルス圧力： $0.6\text{ MPa}$

[0019]

[Effect of the Invention] While being able to change the porosity filter element of low dust collection efficiency into the porosity filter element which has high dust collection efficiency in the state of low ventilation pressure force loss very easily according to this invention, the porosity filter element which also gave an antistatic function and non-adhesiveness can be obtained. Furthermore, the vulcanization fluorine contained in the porous surface formed on the surface of the filter element does not have a fear of a porous surface being able to follow deformation of a filter element enough, and a crack etc. occurring on the front face of the porous surface concerned in the back wash pulse performed in case dust is discarded, since the elongation at the time of tension is large.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The typical fragmentary sectional view showing an example of the filter element of this invention.

[Description of Notations]

1 Resin Particle

11 Aperture of Opening

2 Porous Surface Which Consists of Vulcanizate of Fluororubber

21 Aperture of Porous Surface

3 Fluororesin

4 Conductive Matter

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CLAIMS

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[Claim(s)]

[Claim 1] The filter element characterized by forming the porous surface of the vulcanizate of a fluororubber in the front face of the filter element which has the opening which sintered the resin particle and was obtained.

[Claim 2] The filter element according to claim 1 to which a porous surface is characterized by consisting of the vulcanizate and the fluoro-resin of a fluororubber.

[Claim 3] The filter element according to claim 1 characterized by a porous surface consisting of conductive matter with which the surface electrical resistivity of the vulcanizate of a fluororubber and a filter element becomes 1010 or less ohm/sq.

[Claim 4] The filter element according to claim 1 characterized by a porous surface consisting of conductive matter with which the vulcanizate of a fluororubber, a fluoro-resin, and the surface electrical resistivity of a filter element become 1010 or less ohm/sq.

[Claim 5] The manufacture approach of the filter element characterized by applying and drying the suspension which suspended the vulcanizing agent of a fluororubber and a fluororubber on the front face of the filter element which has the opening which sintered the resin particle beforehand and was obtained, and forming a porous surface in it.

[Claim 6] The manufacture approach of the filter element according to claim 5 characterized by suspension consisting of the vulcanizing agent and fluoro-resin of a fluororubber and a fluororubber.

[Claim 7] The manufacture approach of the filter element according to claim 5 characterized by suspension consisting of conductive matter with which the vulcanizing agent of a fluororubber and a fluororubber and the surface electrical resistivity of a filter element become 1010 or less ohm/sq.

[Claim 8] The manufacture approach of the filter element according to claim 5 characterized by suspension consisting of conductive matter with which the vulcanizing agent of a fluororubber and a fluororubber, a fluoro-resin, and the surface electrical resistivity of a filter element become 1010 or less ohm/sq.

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[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2002-239319

(P2002-239319A)

(43) 公開日 平成14年8月27日 (2002.8.27)

(51) Int.Cl.

B 0 1 D 39/16

識別記号

F I

B 0 1 D 39/16

キーワード (参考)

H 4 D 0 1 9

審査請求 未請求 請求項の数 8 O L (全 5 頁)

(21) 出願番号 特願2001-46129(P2001-46129)

(22) 出願日 平成13年2月22日 (2001.2.22)

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Fターム (参考) 4D019 AA01 BA03 BA13 BB06 BB07

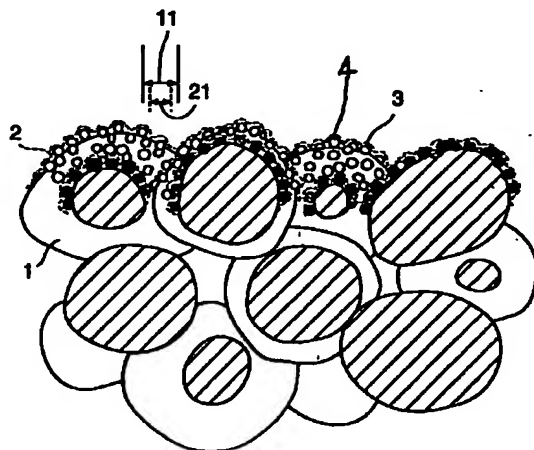
BB08 BC09 BC15

(54) 【発明の名称】 フィルタエレメント及びその製造方法

(57) 【要約】

【課題】 低い通気圧力損失と高い集塵効率の両方を有すると共に、帯電防止機能及び非粘着性を有するフィルタエレメント及びその製造方法を提供する。

【解決手段】 樹脂粒子1を焼結して得られた空隙を有するフィルタエレメントの表面に、フッ素ゴムの加硫物、必要に応じてフッ素樹脂3及び導電性物質を含有した原料で多孔性表層2を形成したことを特徴とするフィルタエレメント及びその製造方法。





## 【特許請求の範囲】

【請求項1】 樹脂粒子を焼結して得られた空隙を有するフィルタエレメントの表面に、フッ素ゴムの加硫物の多孔性表層を形成したことを特徴とするフィルタエレメント。

【請求項2】 多孔性表層が、フッ素ゴムの加硫物とフッ素樹脂よりなることを特徴とする請求項1記載のフィルタエレメント。

【請求項3】 多孔性表層が、フッ素ゴムの加硫物とフィルタエレメントの表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質よりなることを特徴とする請求項1記載のフィルタエレメント。

【請求項4】 多孔性表層が、フッ素ゴムの加硫物、フッ素樹脂及びフィルタエレメントの表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質よりなることを特徴とする請求項1記載のフィルタエレメント。

【請求項5】 予め樹脂粒子を焼結して得られた空隙を有するフィルタエレメントの表面に、フッ素ゴムとフッ素ゴムの加硫剤とを懸濁した懸濁液を塗布及び乾燥して多孔性表層を形成することを特徴とするフィルタエレメントの製造方法。

【請求項6】 懸濁液が、フッ素ゴム、フッ素ゴムの加硫剤及びフッ素樹脂よりなることを特徴とする請求項5記載のフィルタエレメントの製造方法。

【請求項7】 懸濁液が、フッ素ゴム、フッ素ゴムの加硫剤及びフィルタエレメントの表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質よりなることを特徴とする請求項5記載のフィルタエレメントの製造方法。

【請求項8】 懸濁液が、フッ素ゴム、フッ素ゴムの加硫剤、フッ素樹脂及びフィルタエレメントの表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質よりなることを特徴とする請求項5記載のフィルタエレメントの製造方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、含塵ガスから粒子を分離捕集する集塵機、例えば工場における製品捕集や環境保全のための集塵機中に組み込むフィルタエレメントに係るものであり、特に、低い通気圧力損失と高い集塵効率の両機能を具備すると共に、帯電防止機能及びフィルタエレメント表面に堆積した粉塵を払い落とす際に粉塵剥離性が良好なフィルタエレメント及びその製造方法に関する。

## 【0002】

【従来技術及びその問題点】従来、工場等において発生する粉体や塵を捕集することを目的として、合成樹脂粉体を焼結して空隙を成形することにより連通多孔質化したフィルタエレメントが用いられている。

【0003】フィルタエレメントが有する粉塵付着性能

は、多孔質体の空隙の孔径の大きさに依存するが、この空隙の孔径の大きさは原料となる樹脂粉体の粒子径の大きさによって異なる。例えば、樹脂粉体の粒子径が大きいものを原料として用いて焼結成形したフィルタエレメントであると、空隙の孔径が大きくなり、したがって粒子径の大きい粉体は通過されるが、しかし粒子径の小さい粉体は素通りして通過できず、集塵効率の低いフィルタとなる。

【0004】一方、樹脂粉体の粒子径が小さいものを原料として用いて焼結成形したフィルタエレメントであると、空隙の孔径が小さくなり、したがって粒子径の小さい粉体も通過されるが、しかし高圧力損失のフィルタとなる。また、樹脂粉体の粒子径を小さい原料を使用し、圧力損失を低く抑えようとすると、フィルタエレメントの肉厚を薄くする必要があり、これによってフィルタエレメントの強度が低下して実用性に欠ける。さらに、一般的に市販されているベレットや粉末体を粉砕してフィルタエレメントの原料を得る場合には、粒子径の小さい粉体を得ることが難しい。

【0005】上述の従来焼結成形法によるフィルタエレメントの製造方法では、フィルタエレメントを構成する多孔質体の空隙の孔径を最適にして、低い圧力損失でかつ高い集塵効率の両機能を満足するフィルタエレメントを製造するのは技術的に難しかった。

【0006】また、別の問題としてフィルタエレメントは、粉塵間で生じる帯電が原因で粉塵爆発が起こる可能性があり、これを防止するためにフィルタエレメントの表面に帯電防止性が付与されることも多い。更に、フィルタエレメントの表面に堆積した粉塵は、適宜行われる逆洗パルスによって払い落とされるが、剥離性を良くするためにもフィルタエレメントに帯電防止性や非粘着性が要求される場合が多い。

【0007】従来、フィルタエレメントの表面に帯電防止性を付与する方法としては、例えば、予め樹脂粉体にカーボンや金属等の導電性粉体を混合し、その後この混合物を焼結成形してフィルタエレメントを製造する方法、或いは、予め樹脂粉体とカーボンや金属等の導電性粉体を熔融混練し、導電性物質を分散させた樹脂を製造し、次いで当該樹脂を粉砕して粉砕物とした後、これを焼結成形してフィルタエレメントを製造する方法等が採用されている。

【0008】しかしながら、帯電防止性付与を目的とした上記の前者方法では、焼結樹脂粉体から導電性物質の脱落が起きたり、焼結樹脂粉体間に存在する導電性物質が当該焼結樹脂粉体同士の接触を弱めるので、フィルタエレメントの機械的強度を極端に低下させるという問題があった。また、帯電防止性付与を目的とした上記の後者方法においても、焼結樹脂粉体中に存在する導電性物質が当該焼結樹脂粉体同士の接触を弱めるので、フィルタエレメントの機械的強度を極端に低下させるという問

題があった。

【0009】

【課題を解決する手段】本発明は、上記の諸問題を解決した低圧力損失で高い集塵効率を有し、かつ帯電防止機能と非粘着性をも有するフィルタエレメント及びその製造方法を提供しようとするもので、その要旨は、1) 樹脂粒子を焼結して得られた空隙を有するフィルタエレメントの表面に、フッ素ゴムの加硫物の多孔性表層を形成したことを特徴とするフィルタエレメントである。

2) 多孔性表層が、フッ素ゴムの加硫物とフッ素樹脂よりなることを特徴とする上記1)のフィルタエレメントである。

3) 多孔性表層が、フッ素ゴムの加硫物とフィルタエレメントの表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質よりなることを特徴とする上記1)のフィルタエレメントである。

4) 多孔性表層が、フッ素ゴムの加硫物、フッ素樹脂及びフィルタエレメントの表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質よりなることを特徴とする上記1)のフィルタエレメントである。

5) 予め樹脂粒子を焼結して得られた空隙を有するフィルタエレメントの表面に、フッ素ゴムとフッ素ゴムの加硫剤とを懸濁した懸濁液を塗布及び乾燥して多孔性表層を形成することを特徴とするフィルタエレメントの製造方法。

6) 懸濁液が、フッ素ゴム、フッ素ゴムの加硫剤及びフッ素樹脂よりなることを特徴とする上記5)のフィルタエレメントの製造方法である。

7) 懸濁液が、フッ素ゴム、フッ素ゴムの加硫剤及びフィルタエレメントの表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質よりなることを特徴とする上記5)のフィルタエレメントの製造方法である。

8) 懸濁液が、フッ素ゴム、フッ素ゴムの加硫剤、フッ素樹脂及びフィルタエレメントの表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質よりなることを特徴とする上記5)のフィルタエレメントの製造方法である。

【0010】

【発明の実施の形態】以下、図面を用いて実施の形態を説明する。図1は、本発明のフィルタエレメントの一例を示す模式的な部分断面図である。図1において、1は樹脂粒子、1'は空隙の孔径、2はフッ素の加硫物質よりなる多孔性表層、2'は多孔性表層の孔径、3はフッ素樹脂及び4は導電性物質である。

【0011】本発明において、フィルタエレメントを製造するための焼結樹脂原料としては、樹脂の平均粒子径が $50\sim600\mu\text{m}$ のポリエチレン、ポリプロピレン、フェノール樹脂、ポリエーテルサルフォン、ポリエーテルイミド、ポリサルフォン、ポリカーボネート等の樹脂粒子1が好適に使用できる。上記樹脂原料を焼結して得ら

れた空隙を有するフィルタエレメントの表面に、フッ素ゴムの加硫物の多孔性表層2を形成することにより、当該フィルタエレメントに形成された空隙の孔径1'を狭めることができ、これによってフィルタエレメントの粉塵通過効率を制御することができる。上記多孔性表層2が、フッ素ゴムの加硫物とフッ素樹脂3とを含有した原料で形成することにより、粉塵通過効率が制御され、かつフィルタエレメント表面に非粘着性を付与されたフィルタエレメントを得ることができる。これら多孔性表層2の原料は、フッ素ゴムとフッ素ゴムの加硫剤とを水に分散させたエマルジョン、又はフッ素ゴム、フッ素ゴムの加硫剤及びフッ素樹脂の三者を水に分散させたエマルジョンの状態で使用するとよい。

【0012】上記多孔性表層2が、フッ素ゴムの加硫物とフィルタエレメントの表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質4を含有した原料で形成することにより、粉塵通過効率が制御され、かつ粉塵爆発の危険性が極めて小さいフィルタエレメントを得ることができる。上記多孔性表層2が、フッ素ゴムの加硫物、フッ素樹脂3及びフィルタエレメントの表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質4を含有した原料で形成することにより、粉塵通過効率が制御され、フィルタエレメント表面に非粘着性を付与され、かつ粉塵爆発の危険性が極めて小さいフィルタエレメントを得ることができる。これらのフッ素樹脂3及び導電性物質4は、図1に示すように多孔性表層2に含有されて空隙の孔径1'を、多孔性表層の孔径2'まで狭めることにより集塵効率を向上することができる。

【0013】また、多孔性表層2に上記数値の導電性をもたせるために上記エマルジョン液に添加する物質としては、カーボンブラックや導電性ウィスカの粉体を用いることが望ましく、少量の界面活性剤によってこれらの導電性物質4を分散化したエマルジョンとすることが望ましい。表面電気抵抗率が $10^{10}\Omega/\text{sq}$ を超えると、粉塵が帯電して付着が起こりやすくなって堆積が早まると共に通過方向と逆向きにバースエアーを送る逆洗による払い落としがしにくくなる。さらに、 $10^{10}\Omega/\text{sq}$ 以下にすることによって、表面に付着する粉塵間の帯電量を減らして、粉塵爆発の危険が無くなる。

【0014】本発明のフィルタエレメントの製造方法としては、予め樹脂粒子1を焼結成形して得られた空隙を有するフィルタエレメントの表面に、フッ素ゴム及びフッ素ゴムの加硫剤を懸濁した懸濁液を塗布するか、必要に応じて、この懸濁液にフッ素樹脂3や表面電気抵抗率が $10^{10}\Omega/\text{sq}$ 以下となるような導電性物質4を分散させたエマルジョン液を塗布し、これを乾燥して多孔性表層2を形成するフィルタエレメントの製造工程を行えばよい。このようにして得られた加硫されたフッ素ゴムの多孔性表層2は、フィルタエレメント側が架橋によるゴム成分が多くて付着力に優れると共に表面側がフッ素

分が多くて払い落とし性が優れている。

【0015】

【実施例】以下本発明の実施例を具体的に説明するが、本発明はこれに限定されるものではない。本発明において、フィルタエレメントの焼結した樹脂粒子1の空隙の孔径11は、フィルタエレメントの表面を目盛り付の顕微鏡で観察し、表面に明確に表れた空隙の孔径を測定し、1平方センチあたりの平均値を算出したものである。まず、平均粒子径が200 $\mu$ mの超高分子量ポリエチレンを焼結して、平均空隙の孔径11が50 $\mu$ m、厚さが2.5mmの空隙を有する樹脂焼結体であるフィルタエレメント(N $\circ$ 1)を成形した。次いで、イオン交換水にフッ素樹脂3及びフッ素ゴムの加硫物を分散させたエマルジョンに、カーボンブラックを表1に示す質量比で分散させた液体を、前記の樹脂焼結体の表面に29.0g/m<sup>2</sup>の液量で塗装した後、150℃で30分間加熱して多孔性表層2有するフィルタエレメント(N $\circ$ 2)を得た。

\*

表1. 塗装液配合割合(質量%)

| サンプル | 水   | フッ素樹脂+フッ素ゴムの加硫物 | カーボンブラック |
|------|-----|-----------------|----------|
| A    | 170 | 50              | 30       |

【0018】

※ ※【表2】

表2. 塗装前後の圧力損失、表面抵抗率及び粉体捕集性能の評価結果

| No | フィルタエレメント      | 圧 損<br>(kPa) | 表面抵抗率<br>( $\Omega$ /sq) | 粉体捕集<br>性能 |
|----|----------------|--------------|--------------------------|------------|
| 1  | 樹脂焼結体+ (塗装無し)  | 1.33         | 10 <sup>10</sup>         | 粉漏れあり      |
| 2  | 樹脂焼結体+ (サンプルA) | 2.66         | 10 <sup>8</sup>          | 粉漏れ無し      |

1) 圧力損失測定は、濾過風速1m<sup>3</sup>/m<sup>2</sup>・minで行った。

2) 粉体捕集試験使用粉塵: CaCO<sub>3</sub> (D<sub>p50</sub>=4.5 $\mu$ m)

: 粉塵濃度=25g/m<sup>3</sup>

: 濾過速度=1.0m/min

3) 逆洗パルス圧力 : 0.6MPa

【0019】

【発明の効果】本発明によれば、極めて簡単に、低い集塵効率の多孔質フィルタエレメントを低い通気圧力損失状態で高い集塵効率を有する多孔質フィルタエレメントに変えることができると共に、帯電防止機能及び非粘性も付与した多孔質フィルタエレメントを得ることができる。更に、フィルタエレメントの表面に形成された多孔性表層に含まれる加硫フッ素は、引張り時の伸びが大きいので粉塵を払い落とす際に行なわれる逆洗パルスにおいて、フィルタエレメントの変形に多孔性表層が十分追従でき当該多孔性表層の表面にクラック等が発生する★50

40★心配がない。

【図面の簡単な説明】

【図1】本発明のフィルタエレメントの一例を示す模式的な部分断面図。

【符号の説明】

- 1 樹脂粒子
- 11 空隙の孔径
- 2 フッ素ゴムの加硫物よりなる多孔性表層
- 21 多孔性表層の孔径
- 3 フッ素樹脂
- 4 導電性物質

【図1】

